



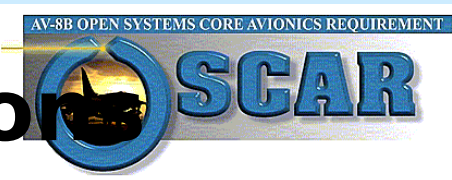
Open Systems Core Avionics Requirement

Nick Carter
OSCAR Applications
Manager





AV-8B Fleet Configuration



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• Night Attack

- ❑ NAVFLIR/Night Vision Goggles
- ❑ Digital Moving Map
- ❑ Triples the Number of Expendables



• Harrier II Plus

- ❑ APG-65 Multimode Radar
- ❑ Night Attack
- ❑ Provisions for Beyond Visual Range Weapons

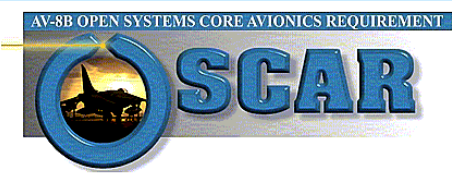


• Day Attack / Trainer

- ❑ Twice Payload/Radius AV-8A
- ❑ Digital Avionics/Integrated Cockpit



OSCAR Vision



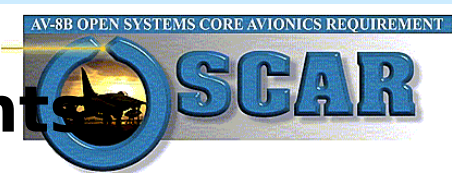
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“To Significantly Reduce the Life Cycle Support Costs of the AV-8B Avionic System Through the Application of Open System Principles, Commercial Technologies and Acquisition Reform Initiatives”

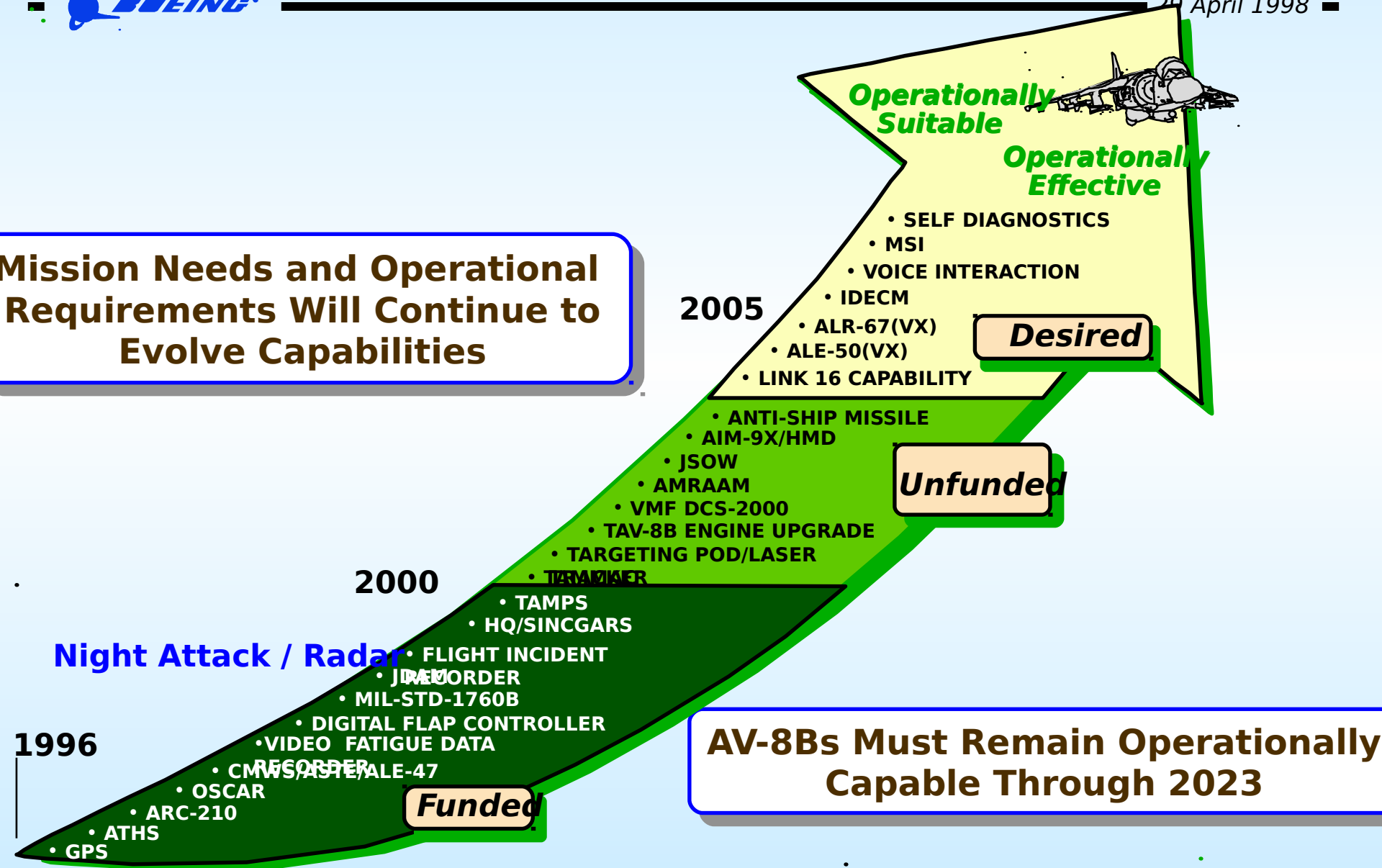


AV-8B Operational Requirements



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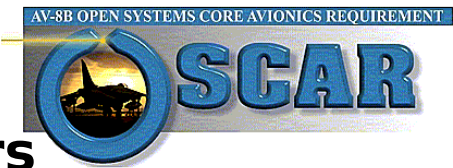
Mission Needs and Operational Requirements Will Continue to Evolve Capabilities



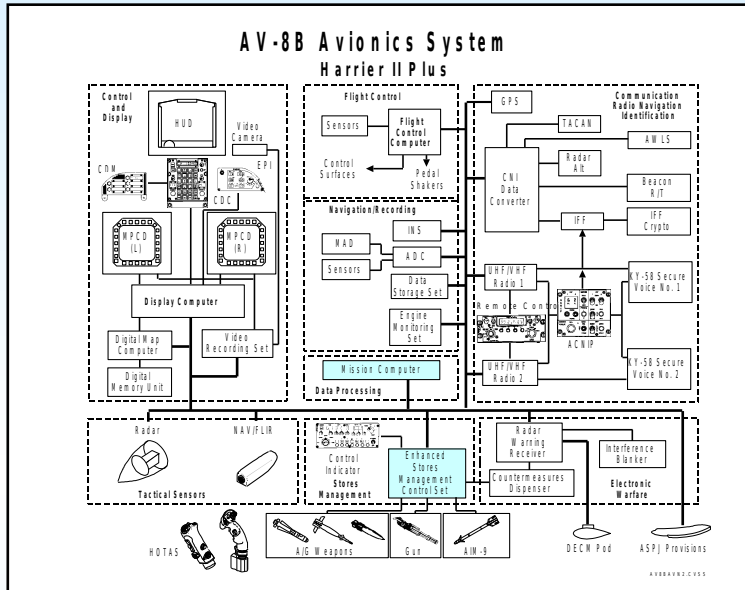


OSCAR Focus

Software Maintenance Cost Drivers

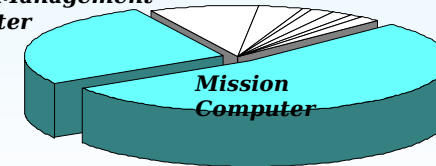


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Two Components Impact ~ 75% of Routine Update Maintenance Cost

Stores Management Computer

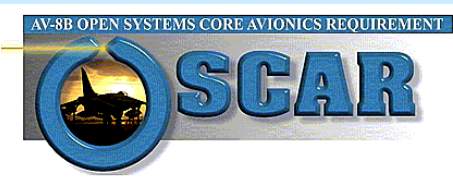


Mission Computer
Stores Management Computer

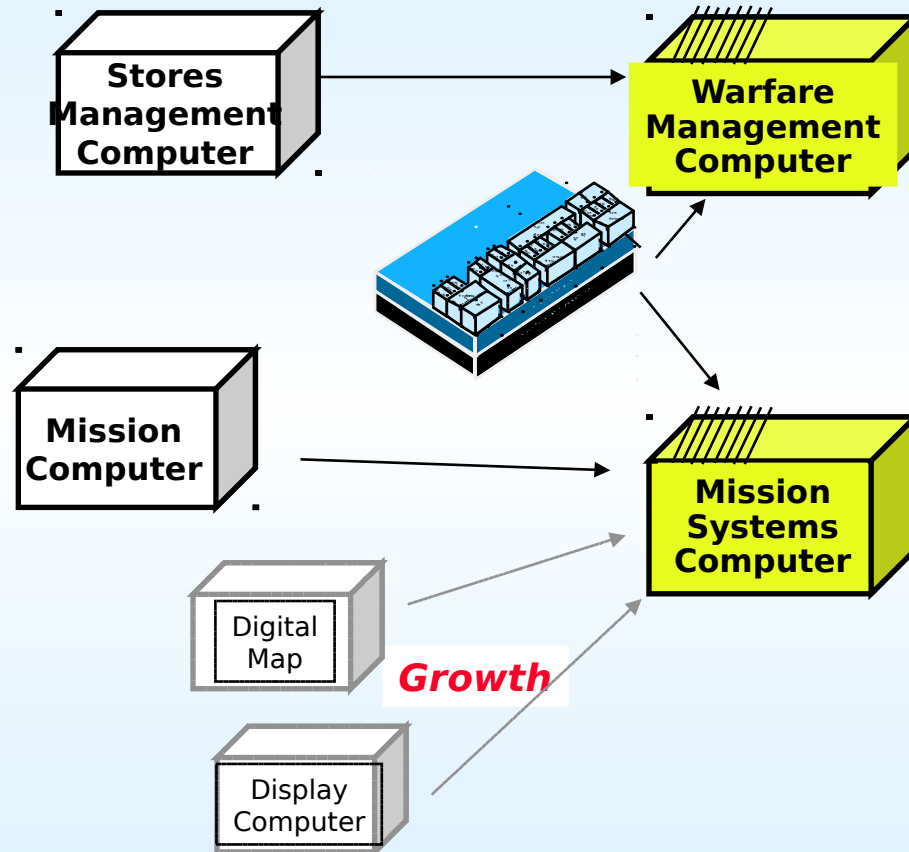
Addresses The High Payoff Areas



The OSCAR Solution



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Modular Avionics

- Retains Form, Fit, Function
- VME 64 Backplane
- VME 6U Form Factor

Modular Software

- Reusable Across Platforms
- Hardware Independent
- OO Design, C++
- Well Defined Interfaces

Reduced Support Cost

- O to OEM 2-Level Maintenance
- Extended Warranty
- Guaranteed Turn-Around Time

Streamlined Acquisition

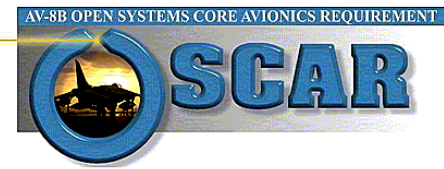
- Performance Specs
- Leverage Off Commercial

**Meets Today's Requirements
While**

Positioning for Future Growth



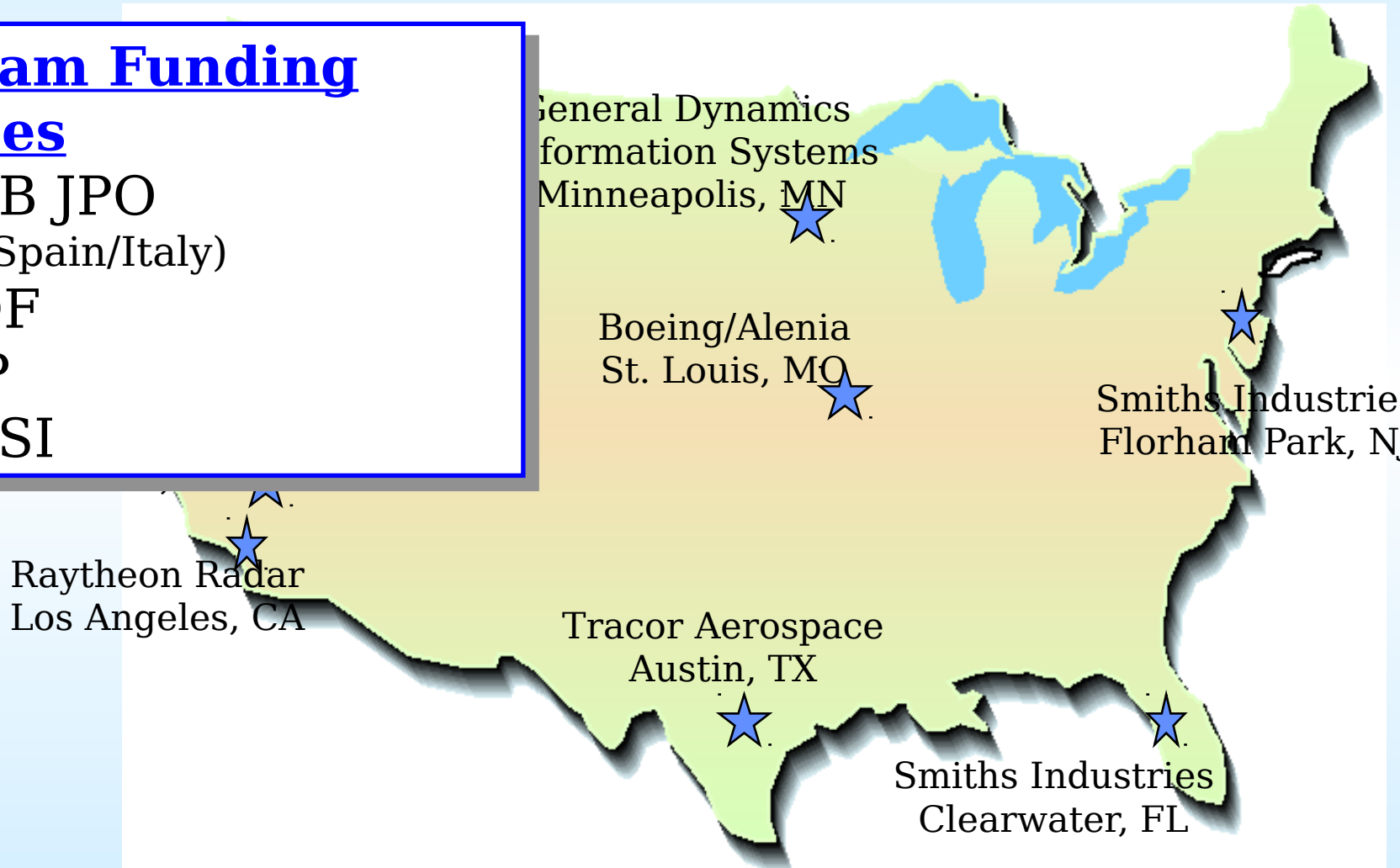
OSCAR Program Structure



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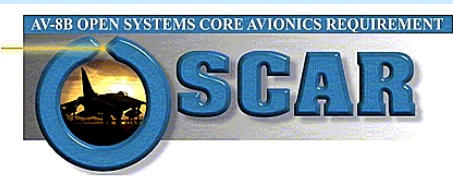
Program Funding Sources

- AV-8B JPO
(USMC/Spain/Italy)
- DBOF
- CTIP
- COSSI

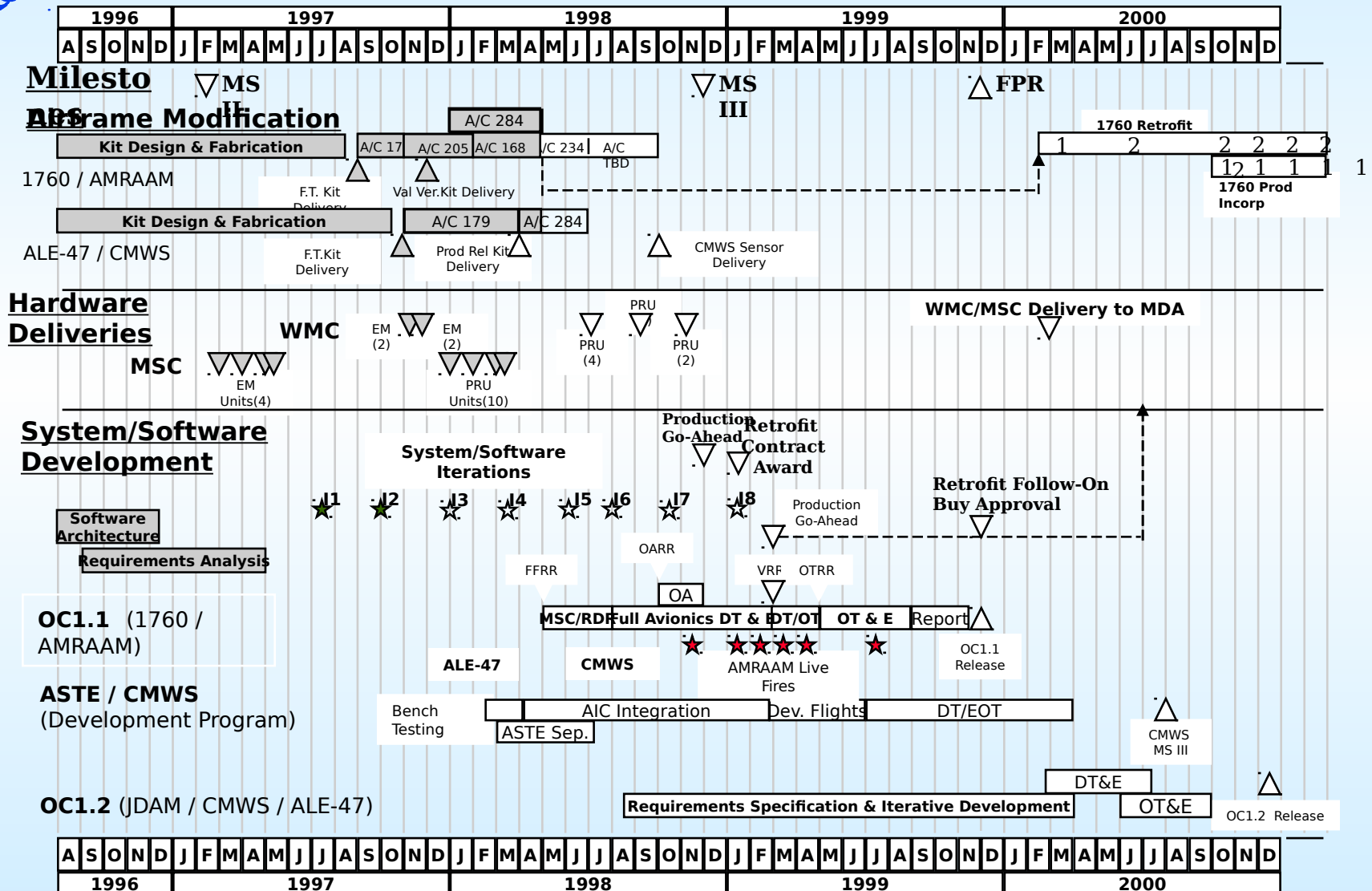




OSCAR Schedule Summary



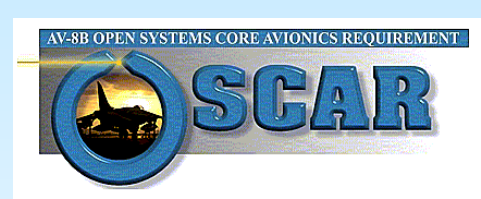
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5 May 97



OSCAR Uses Standard Interfaces



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OSCAR is an Open System Architecture Which Standardizes Physical, Electrical, and Software Interfaces at Line Replaceable Module Level...

• Software

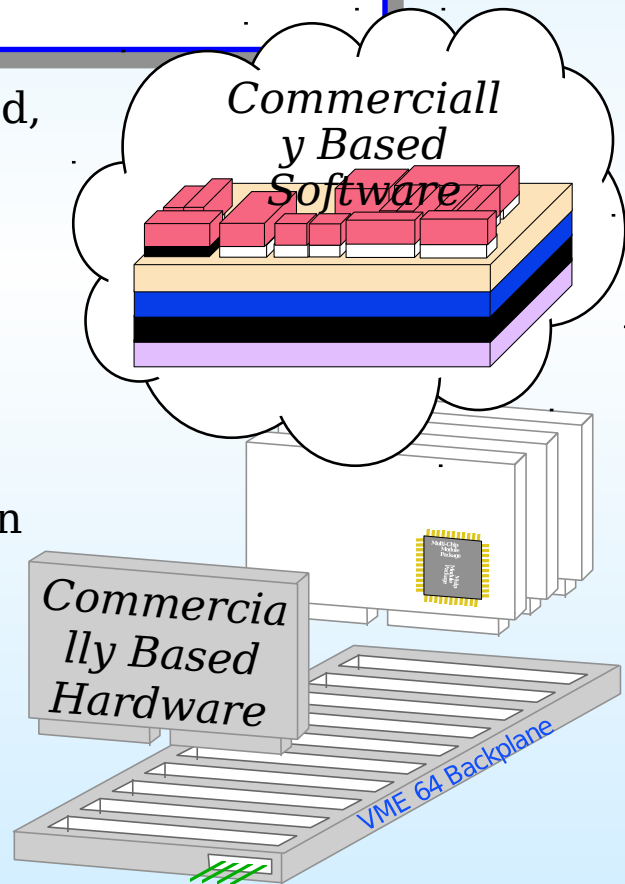
- Commercially Supported, Object Oriented, High Order Language (e.g. C++)
- COTS Development Tools and Processes
- IEEE/ANSI STD P1003 POSIX Compliant Real-Time Operating System (e.g. VxWorks)
- COTS Software Components (e.g. VME Drivers and Interrupt Handlers)
- Industry STD CORBA Compliant Application Program Interface (API)

• Mechanical

- IEEE 1101.2 Conduction Cooled VME 6U Module

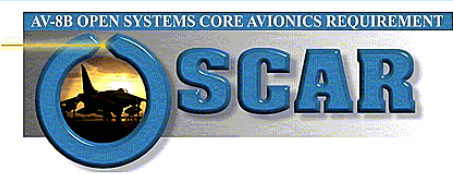
• Electrical

- ANSI/VITA STD 1-1994 VME-64 Backplane Bus
- ANSI STD X3.230-1994 Fibre Channel Bus

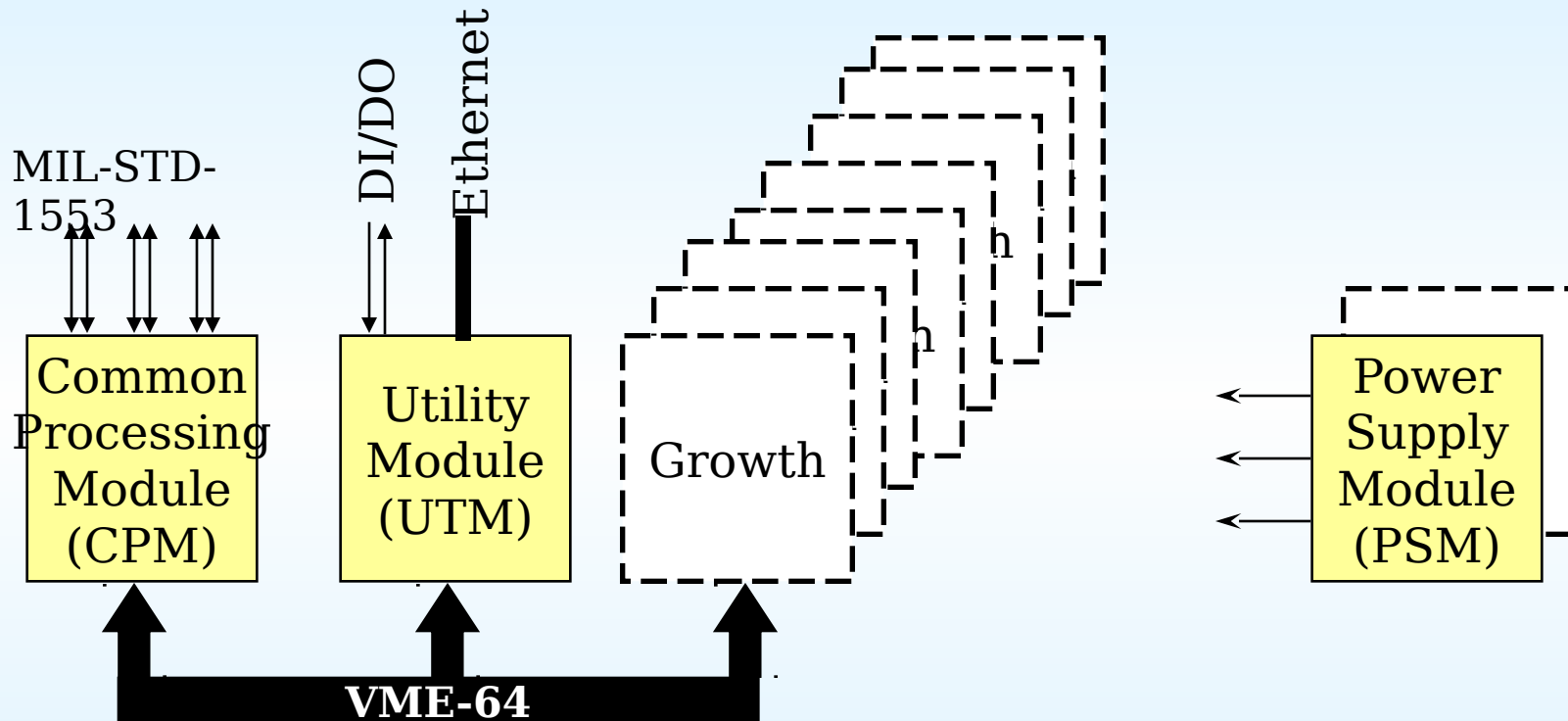




MSC Architecture



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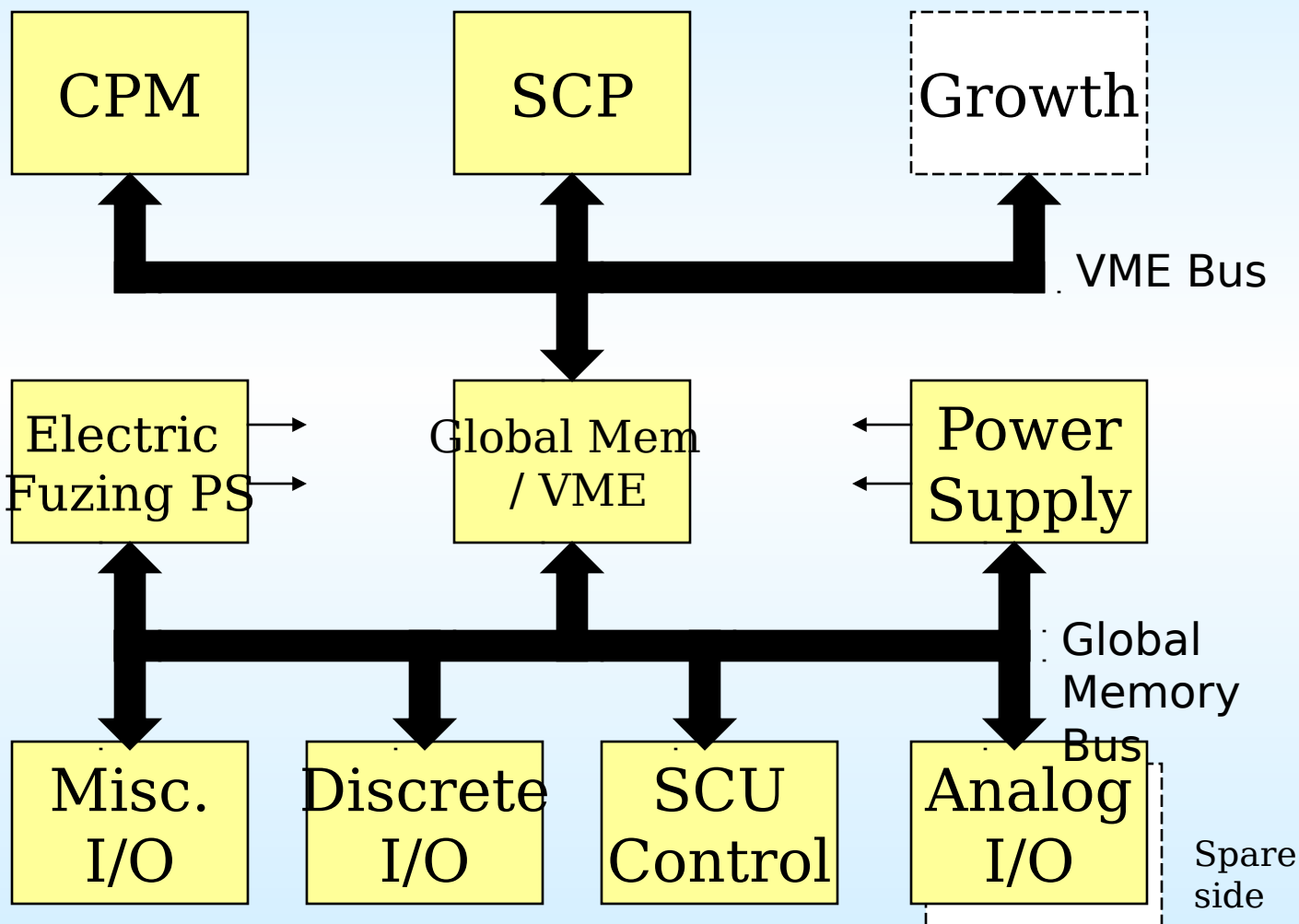




WMC Architecture



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CPM Commonality

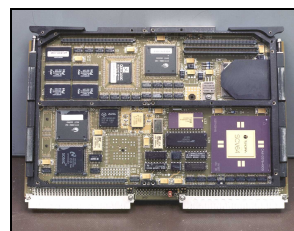
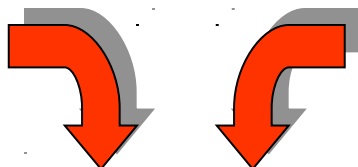


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Memory
Mezzanine
16, 32 or 64MB



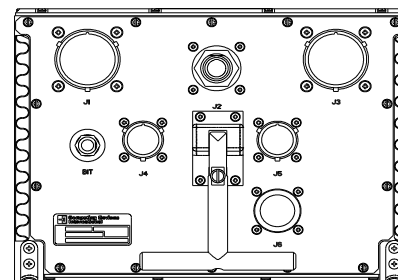
MIL-STD-1553
Mezzanine
1, 2, or 3 channels



CPM

Dy-4

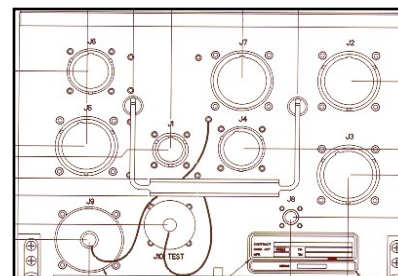
GDIS



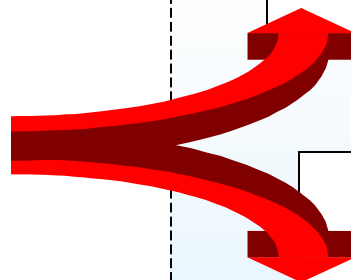
MS

C

Smiths

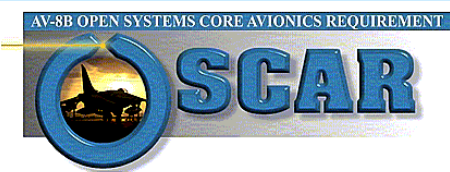


WM



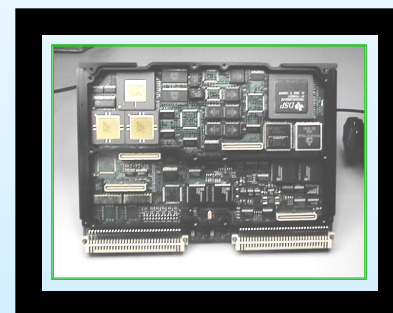
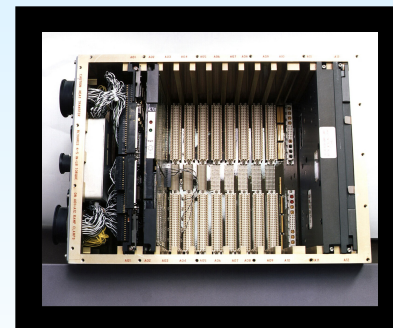


Avionics HW Status



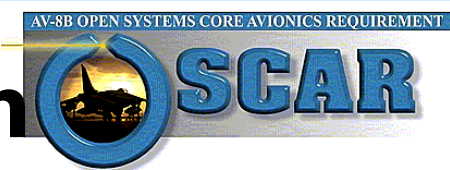
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- Mission Systems Computer (GDIS)
 - **All Subsystem CDR Actions Closed**
 - **All EMD Units Delivered to Boeing (4)**
 - **Production Relevant Units Delivered (6)**
- Warfare Management Computer (Smiths Industries)
 - **All Subsystem CDR Actions Closed**
 - **All EMD Units Delivered to Boeing (4)**
 - **Production Relevant Unit Delivery - Jul 98**
- ALE-47/39 Module (Tracor Aerospace)
 - **All Subsystem CDR Actions Closed**
 - **EMD Units Delivered to Boeing (4)**
 - **Production Relevant Unit Delivery - Jun 98**

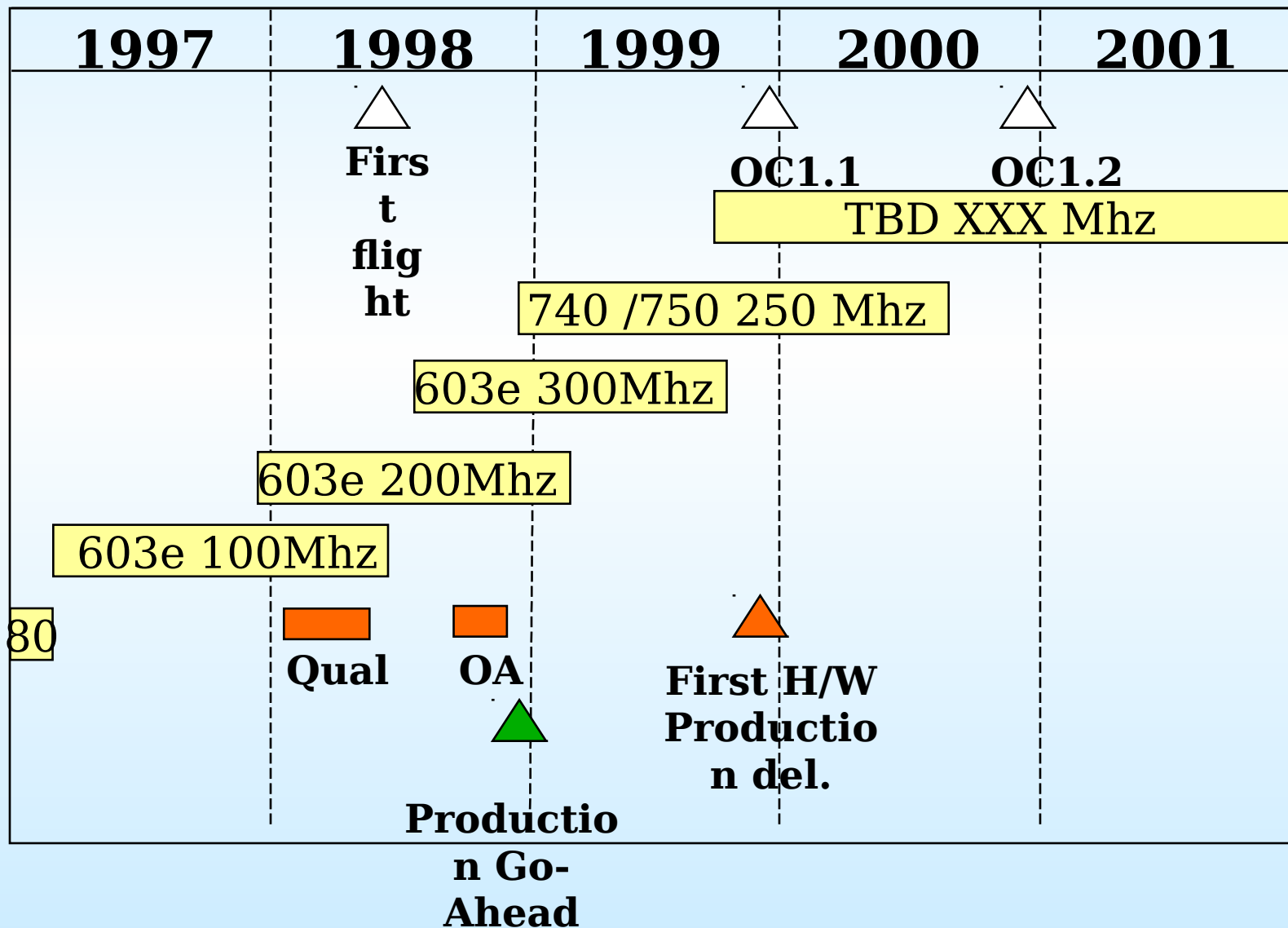




Technology Roll Plan



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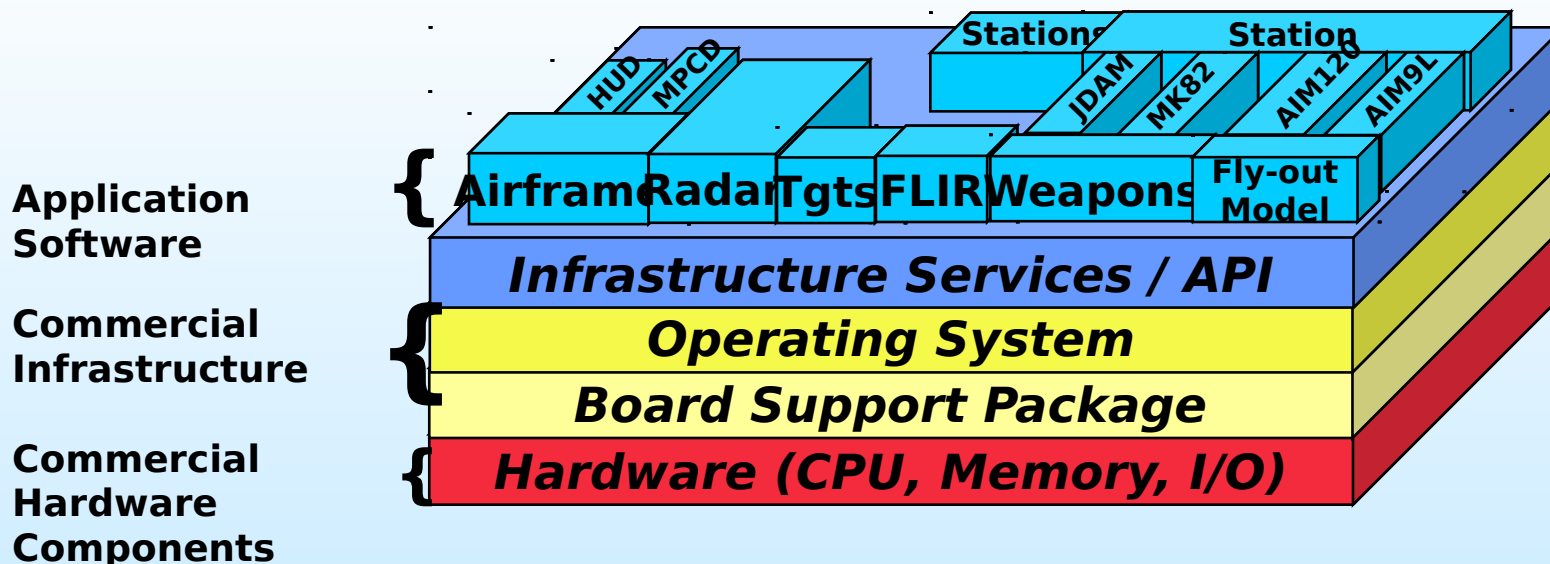
OSCAR Software Architecture



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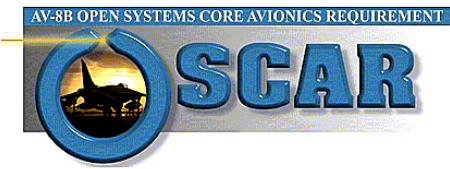
OSCAR Code & Design Reuse

- Hardware Independence
- Tools/Process Reuse
- Reuse In Non-Flight Domains
 - Simulators, Trainers, Maintenance
- Reduced Regression Testing





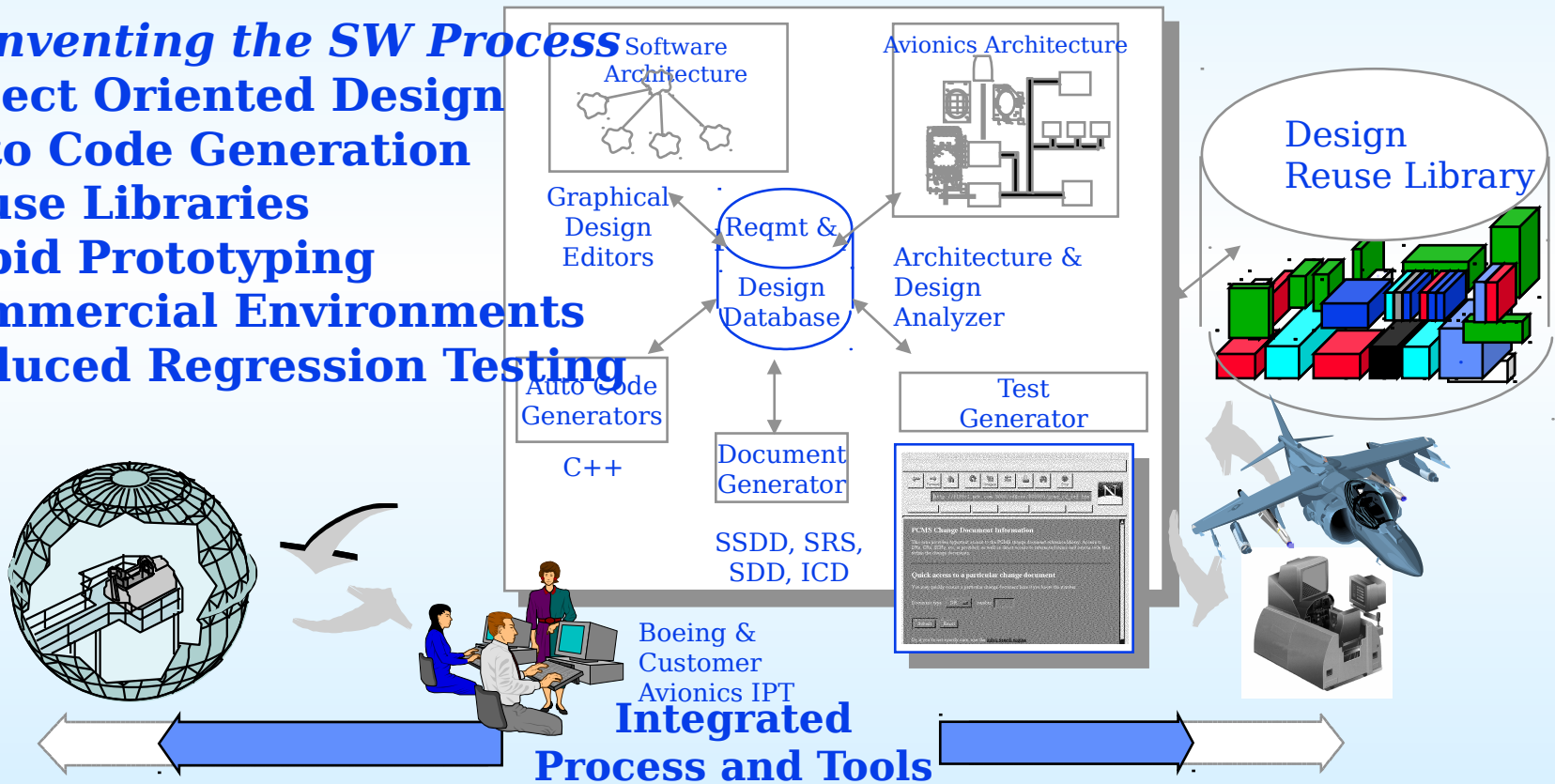
OSCAR Software Engineering Environment



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Re-Inventing the SW Process

- Object Oriented Design
- Auto Code Generation
- Reuse Libraries
- Rapid Prototyping
- Commercial Environments
- Reduced Regression Testing





Open System Benefits



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- **Commercial Processor Marketplace Leverage**
 - Started with 80MHz, 100MHz Upgrade, 200MHz Today
 - Reduced Upgrade Cost/Schedule/Risk
- **Commercial Hardware Improves “Time to Market”**
 - Solutions Readily Available
 - Used Commercial Convection Cooled Hardware for Prototype
- **Commercial Software Marketplace Leverage**
 - Tools Available Now
 - No NRE Required for Development
- **Interfaces Already Defined**
 - Less Upfront Technology Investment Required

“Better/Faster/Cheaper”



Open System Challenges



29 April 1998

- **High Performance 1553 Not Commercially Available**
 - Some Development Required
- **Adequate Memory/Throughput**
 - Difficult to Achieve with Current Technology(1553 Overhead)
 - Commercial O/S Adds Processing Overhead
- **Test Philosophy Does Not Support Rapidly Changing Technology**
 - Typical Flight Test Program is 12-18 Months
 - Processor Technology Roll is Less than 12 Months
- **Avionic Environment Difficult to Achieve at "71°C"**
 - Some

**Benefits of Open Systems
Far
Outweigh Challenges**